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Advertising Information and Consumer Demand: The Case of Agricultural Commodity Promotion

By

T. Kesavan, H.H. Jensen, and S.R. Johnson*

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*The authors are Research Associate, Assistant Professor, and Professor, respectively, Center for Agricultural and Rural Development, Department of Economics, Iowa State University, Ames, Iowa 50011

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Introduction

Within the last decade, promotion of farm commodities and advertising to directly expand the demand for farm products have increased in both domestic and foreign markets. Yet the impact of such advertising on consumer demand is still not well understood. In part, this is because traditional economic models of consumer behavior do not explicitly account for the process of acquiring information in the context of existing consumer attitudes and beliefs. Economists have not readily accepted the idea that advertising alters utility itself (Stigler and Becker). Instead, advertising viewed as providing information about product characteristics, price, or quality, shifts demand. The research reported in this paper addresses the question of how advertising affects the underlying structure of information, and how that in turn may affect demand.

A large share of the funds collected recently by producer checkoff programs has been spent on commodity promotions, especially on generic advertising. Much of the promotion has focused on providing information about product characteristics or qualities. Several recent studies have shown this generic advertising to have led to an increase in aggregate demand for some commodities or at least reduction in the rate of decline in per capita consumption (Ward and Myers). Some of this commodity promotion has been directed towards providing information about health and the nutritional aspect of commodities in order to increase demand for the product. Examples of these are the promotion campaigns for eggs, milk, pork, and prunes. Such information makes consumers aware of the health-related product qualities.

Evaluation of the effectiveness of these promotional campaigns appropriately should take into account the consumer's processing of this information.

This paper is organized as follows. First we review current economic models which incorporate product quality or attributes. Next, we develop a model to represent the process of acquiring information from advertising and the effect of advertising on consumption decisions. The model is then specialized to the case of promotion of dairy products as a source of calcium and evaluated using data from a market tracking study. The results have implications for the structure and interpretation of traditional advertising models, and the process of evaluating the promotion of agricultural commodity programs.

Information and Product Quality

Stigler's early work on the economics of information focused on the search for low prices of a homogenous product, given knowledge about the price dispersion in the market. Later, Nelson (1970, 1974) analyzed consumer behavior in markets characterized by joint distributions of both prices and quality. Nelson observed that the information about quality differs from information about price, and that the specification of the consumer information problem must include both quality and price variability when analyzing the market. Many commodities differ in being either "search" goods or "experience" goods: for experience goods, the attributes cannot be effectively evaluated by the consumer prior to the consumption of the product; for search goods,consumers can inspect the product attributes prior to purchase. Based on this distinction, Nelson classified foods as "nondurable experience" goods. Note that if foods convey health benefits as well, they also have aspects of search goods and Nelson's product distinction is less clearcut.

Of course, in reality, since information is costly, consumers are not always well informed. A number of studies attempt to more formally study markets under imperfect information using a Becker-Lancaster approach to multi-attributed products (see Rosen 1978, 1980; Schmalensee; Verma.) The results of these studies have corroborated Nelson's hypothesis that advertising provides information about product characteristics.

Khilstrom (1974 a,b) presented a complete theoretical representation of the acquisition of product quality information, deriving the utility of information from a Bayesian preposterior analysis. He argued strongly that consumers demand commodities because the commodities possess desirable attributes, and that the uncertainty in product quality leads to demand for information. The quantity of information demanded is a decreasing function of the consumer's confidence in his or her a priori expectations of the product qualities. The most appealing feature of this model is that, as a special case of a Bayesian decision model, it bridges the work of the "decision theorists" and "economic theorists" on the role of information in consumer choices.

Recently, Pope, linking generic advertising to the product quality model, adopted the basic Khilstrom framework explicitly incorporating advertising into an expected utility framework. He concluded that understanding the interaction between advertising and the perceived transformation of goods to characteristics is paramount to determining the overall effect of advertising on demand. In order to unambiguously evaluate the effect of advertising on changes in consumer demand, economists must understand how information affects the consumer's attitudes and beliefs.

Unfortunately, economists generally abstract from many aspects of consumer information acquisition on which consumer researchers focus. Among the many factors, the source and type of information consumers seek, the existing knowledge and set of beliefs, and the patterns of information acquisition might be important for identifying the effects of advertising (Wilde; McEwen).

The literature in decision theory suggests several approaches to measuring the impact of advertising. One approach postulates that advertising works in a hierarchial fashion. These are AIDA type models (Attention - Interest - Desire - Action) (Moriarty) and focus on the concept of "involvement" as suggested by Krugman (including awareness of the importance of decision outcome, the degree of actual or perceived risk involved and the degree of felt interest in the subject matter). Alternatively, other researchers emphasize not one "hierarchy of effects" but many. Whatever the case be, decision theory points to the importance of recognizing those response measures which follow directly from, and relate directly to, the advertising.

Certain "tracking" measures, conducted in the "real world" market place, can be used to assess responses overtime (Donius; Haley). This is useful both for planning as well as evaluation purposes. Thus existing consumer research literature can be a great resource to the economists interested in markets characterized by imperfect information. This study is directed toward better understanding of consumer response in markets characterized by imperfect information about product quality and health-related issues.

Conceptual Model

Following Khilstrom and Pope, we use a model in which the effectiveness of advertising information depends on changing consumers' prior subjective probability distributions of beliefs. Consumers demand information to reduce the perceived risk associated with varying product quality in order to make better purchases of commodities. Thus the consumer's final demand decision is a conditional decision based upon the information acquired. Using a Bayesian preposterior analysis, a model representing the consumer decision process with information acquisition, we postulate a model for which we assume that such statistical information can be acquired through advertising.

Figure 1 illustrates such a model and is based on Khilstrom (1974a,b) and Knight et al. Consumers possess prior beliefs about a related issue or product characteristic. Generic advertising provides information about the related issue and/or product characteristics which the consumers use to update their beliefs according to Bayes rule. The resulting posterior belief and awareness influences the consumption decision. An evaluation of the advertising and its effects can be performed by comparing the optimal decisions between the group of consumers who received the particular message through advertising and the group of consumers who did not, provided that the two groups are homogeneous in socioeconomic characteristics.

The consumer decisionmaking process therefore becomes a series of recursive decisions: first consumers get information through advertising; advertising creates awareness of the product quality; and finally consumption patterns reflect the effects of "awareness" of the consumers (as well as their demographics). Following Khilstrom (1974a,b) "awareness"

is defined as an observation $\tilde{Z}_i$ which is normally distributed with mean μ and variance 1. The model of the consumer decision process is:

$$P(I) = f(X_1) \quad (1)$$

$$P(A) = g(I, X_2) \quad (2)$$

$$C = h(P, Y, A, X_3) \quad (3)$$

where P(I) = probability of receiving advertising information; P(A) = probability of creating "awareness" of the product quality as measured by $\tilde{Z}$; C = the consumption of the final product; P =prices; Y = income; and X_1, X_2, and X_3 are sets of socioeconomic factors.

The Case of Calcium Advertising

The present analysis addresses the particular case of agricultural commodity promotion by the National Dairy Board. The Dairy Board has undertaken a broad promotional program, emphasizing the calcium content of milk and other dairy products and the importance of calcium in combatting osteoporosis. Osteoporosis is a disease that has recently been identified as a major public health concern by the Joint Nutrition Monitoring Committee in a review of the health and nutrition status of the U.S. population (U.S. Dept. of Health and Human Services.) Since dairy products provide an excellent source of calcium, the National Dairy Board has launched its advertising campaign, promoting dairy products by informing the consumers about calcium in dairy foods.

The model described above is used to evaluate calcium promotion and its effect on changes in the consumption of dairy products. The information variable in the model represents seeing or hearing an "ad" about the importance of dietary calcium and its source, which in turn creates an

"awareness" of the product characteristic related to health. The final choice of consumption of dairy products is based on the awareness and other socioeconomic characteristics of the individuals.

Data

To evaluate the model empirically, we used data from a Calcium Ad Tracking (CAT) study conducted by Market Facts, Inc. (1985/86) for the National Dairy Board. The survey was a randomly dialed nationwide telephone survey of households, designed to gather information on dairy foods consumptions, attitudes and beliefs related to calcium intake, and awareness of calcium advertising. The data were collected weekly and reported on a monthly basis, during the period November 1985 through October 1986. The sample included women in 2440 households. In order to capture the posterior distribution of awareness, the data were grouped based on levels of income and age. There were four levels of income and three levels of age for each month giving rise to 4x3x12 = 144 observations of grouped data.

The list of variables used in the study is presented in Table 1 with their mean and standard deviation. The socioeconomic characteristics included were the proportion of blacks, proportion of high school graduates and proportion of not married persons in each group. The midpoints of income and age for each group were also included. Monthly dummies controlled for seasonality and for ad campaign efforts. The probability of seeing or hearing an "ad" was obtained from the group mean of the response to whether or not the respondent had seen/heard an "ad" for calcium. To measure "awareness", the responses to whether 'calcium is important' and whether 'milk is a good source of calcium' were used. For the two responses the group mean and variance were computed and transformed into a standard normal variate, $\tilde{Z}$, as follows:

$$\tilde{Z} = \frac{\bar{X}_i - \hat{\mu}}{\sqrt{Var_i/n_i}}$$

where $\tilde{Z}$ = the transformed variable with mean μ a variance 1.

$\bar{X}_i$ = mean of the response for group i

$\hat{\mu}$ = sample mean of the group mean response

Var_i = the variance of the response for group i

n_i = the number of individuals in group i.

By using the probability function for a normal distribution, this $\tilde{Z}$ variable is converted into probabilities of awareness for the two responses. An overall index of probability of awareness was computed using the product of the probability of awareness of importance of calcium and the probability of awareness of milk is a better source of calcium.

The survey had limited information on dairy product consumption. We constructed the consumption variable as the reported frequency of consumption during the month (e.g., everyday means 30 days per month of consuming that product). Dairy consumption included the sum of the frequency of consumptions of milk, cheese, and yogurt. The probability of dairy consumption on a daily basis was obtained by dividing this sum by 90. Similarly from the frequency of consumption of milk and cheese, during the one month period, daily consumption was computed to provide an estimate of probability of consumption for these specific products.

Estimation and Results

Three sets of equations were estimated: those related to ad exposure; to awareness; and to consumption behavior. Because the dependent variables were probability measures and the data were grouped, a weighted least squares method was applied to estimate the parameters. This estimator is also minimum chi-squared and is fully efficient in its own right (Maddala).

Table 2 shows the results of advertising and awareness. The results related to advertising indicated that being older and having a higher proportion of blacks had a negative and significant effect on the probability of seeing or hearing an "ad". The effects of calcium advertising for March and during the summer months (May, June, July) were statistically significant. These effects were consistent with the Dairy Board's advertising on TV during mid-February to mid-March, and again in April and with print ads during the period Febraury through June. The estimated model had an adjusted R^2 of 0.60 and the F statistic was statistically significant.

Next, three versions of the "awareness" equation were estimated in order to understand the effects of socioeconomic characteristics and advertising on "awareness". First, a model was estimated only with monthly dummies as predictors of awareness (Model A). Next, the probability of seeing/hearing an "ad" was included in the model (Model B). Then the set of socioeconomic characteristics was included in the model (Model C).

Among factors affecting the probability of being aware of calcium-related health information were the probability of seeing/hearing an "ad" (Model B), and the monthly dummy for September. It is possible that the effect of probability of "ad" also reflected the effect of the socioeconomic variables. In model C, the effect of the "ad" variable, although still positive in sign, was not statistically significant from zero, and the estimated coefficient was smaller in size. At the same time, the set of socio-economic variables, when tested as a group were not significant. (Interaction between education and "ad", tested in another model, although positive was not statistically significant.) The results of the estimation of the probability of awareness were consistent with advertising of calcium's having a positive effect on awareness .

The estimates of the frequency of consumption of dairy and selected dairy products are reported in Tables 3, 4, and 5. For the dairy foods, milk, and cheese estimates, three types of models were estimated: the "basic" model (I), "cognizant" model (II), and "advertising model" (III). The basic model assumed that consumers based their consumption decision on prices (as proxied by the sociodemographic and monthly dummies) and income, controlling for the effects of sociodemographic variables. Thus the basic model includes no explicit information on advertising or underlying awareness. The "cognizant" model, consistent with the Bayesian framework, evaluates the effect of awareness and underlying beliefs on the decision process. The "advertising" model ascribes the conditioning to whether or not the individual had seen a calcium related ad, i.e., estimating the direct effect of "Ad" on consumption.

First, among all of the models, the explanatory power, measured by adjusted R^2 and the F-statistic, were similar. Also, with the exception of the estimations for cheese (Table 5), none of the monthly binary variables was statistically significant. Evaluating dairy foods as a group and using the "basic" consumption model as a point of reference, the socioeconomic variables showed that age and not being married had negative and statistically significant effects on the consumption of dairy foods (Table 3). Next, the "cognizant" model was not supported in the estimation: awareness by itself, or controlling for demographic variables, did not have a statistically significant effect on the consumption patterns for dairy foods. On the other hand, the positive effects of advertising on consumption patterns were supported in the estimation (Model III). Advertising had a positive and statistically significant effect on consumption when included by itself, and a positive effect (although

significant only at the .20 level) when the socioeconomic variables were included in the estimation.

The results of the models estimated to explain the consumption of milk are presented in Table 4. These results indicated the same pattern as observed for dairy products, but less pronounced. Among the socioeconomic variables only age had a negative and significant effect on consumption of milk. The probability of awareness had a positive effect on increasing the probability of consumption of milk, but the effect was not statistically significant. The probability of seeing/hearing "ad" did not have a significant effect on the probability of consumption of milk. Thus, the results did not support either the "cognizant" model or the "advertising" model for consumption of milk. The estimated models explained between 45 percent and 50 percent of the variation in the probability of consumption of milk.

Table 5 includes the results of the estimated models for probability of consumption of cheese. The results for cheese exhibited a slightly different pattern when compared with those of dairy products and milk. Income, age, and the proportion of not married individuals had a negative and statistically significant influence on the probabilities of consumption of cheese. However, as was the case for milk, neither the awareness of calcium benefits, nor having seen/heard an ad had a statistically significant effect on cheese consumption.

It should be noted that the dependent variables in each of the consumption models were frequency of consumption and do not reflect actual quantity consumed. As only proxies for the true behavior of consumption, they do not reflect the variability in quantities consumed per day. Also, an estimate of the "habitual" or "usual" intake of food (i.e., reported

frequency of consumption) would be likely to reduce the variation in actual consumption to be explained in the estimated model.

There may also be some selection operating relative to who saw or heard the advertisement, i.e., who was exposed to the information. The empirical results (i.e., the reduced significance of advertisement when socioeconomic variables were included) indicated that there might be still some inherent selection problems.

The estimated models were compared, using likelihood ratio tests, to evaluate the significance of groups of variables, thus the different models. The results are presented in Table 6. These tests showed that the socio-economic variables, as a group, had a consistently statistically significant effect on the consumption patterns for dairy, milk, and cheese. Other results were less conclusive. First, for dairy foods as a group the addition of socioeconomic and advertising variables to the monthly dummies was statistically significant: both the probability of "ad" by itself, and use with the socioeconomic variables were statistically significant. This was not the case for the "cognizant" model: neither the "awareness" variable by itself, nor when used in conjunction with the other socioeconomic variables was significantly different from the first model--which included no effects for ad or information. For the milk and for the cheese equations, neither the "cognizant" nor the "advertising" model was better than the basic model, using the likelihood ratio test.

In sum, the tests of the selected models showed for dairy foods as a group, inclusion of advertising added to the explanatory power of the basic model; cognizant effects did not. That is, the empirical results failed to accept the Bayesian decision process; advertising effects, independent of the ad content, do add to the model's explanatory power. However, it is

important to note that the empirical estimates of the probability of awareness are limited to the questions rating 'importance of calcium' and 'milk as a better source of calcium'. These may not adequately measure the true distribution of consumers' beliefs. Clearly, more systematic evaluation of tracking studies with questions structured to evaluate distribution of consumers' beliefs and attitudes more directly are required.

Summary and Conclusions

This study addressed several issues related to analysis of the effects of advertising and information about product quality. The model incorporated beliefs and awareness of consumers into the consumption model based on a decision theoretic approach. The model was formulated and applied to evaluate the effects of calcium advertising. Linear probability models were estimated for information, awareness and consumption, using a minimum chi-squared method for grouped observations.

The empirical results showed mixed evidence for the importance of advertising information in increasing the purchase of dairy foods. Advertising did have a direct effect on creating awareness about a particular message (calcium benefits in this study) and on increasing the consumption of dairy products. However, the effect of such awareness increasing the consumption was less clearcut. Factors related to the selection process of seeing an ad or not appear to be important, although the selectivity process was not tested directly. Further, the analysis was limited to the measures in the tracking data. A more clearcut and tractable measure of "awareness" of the issue is needed to effectively evaluate

the promotion program. Also, better measures of consumption would yield more variation in the consumption variable. The model and approach do investigate the manner in which the process of decision-making is included in the evaluation of advertising impacts. With increased promotional activities by different farmers' organizations, a good representation of a general framework to evaluate promotion program is essential.

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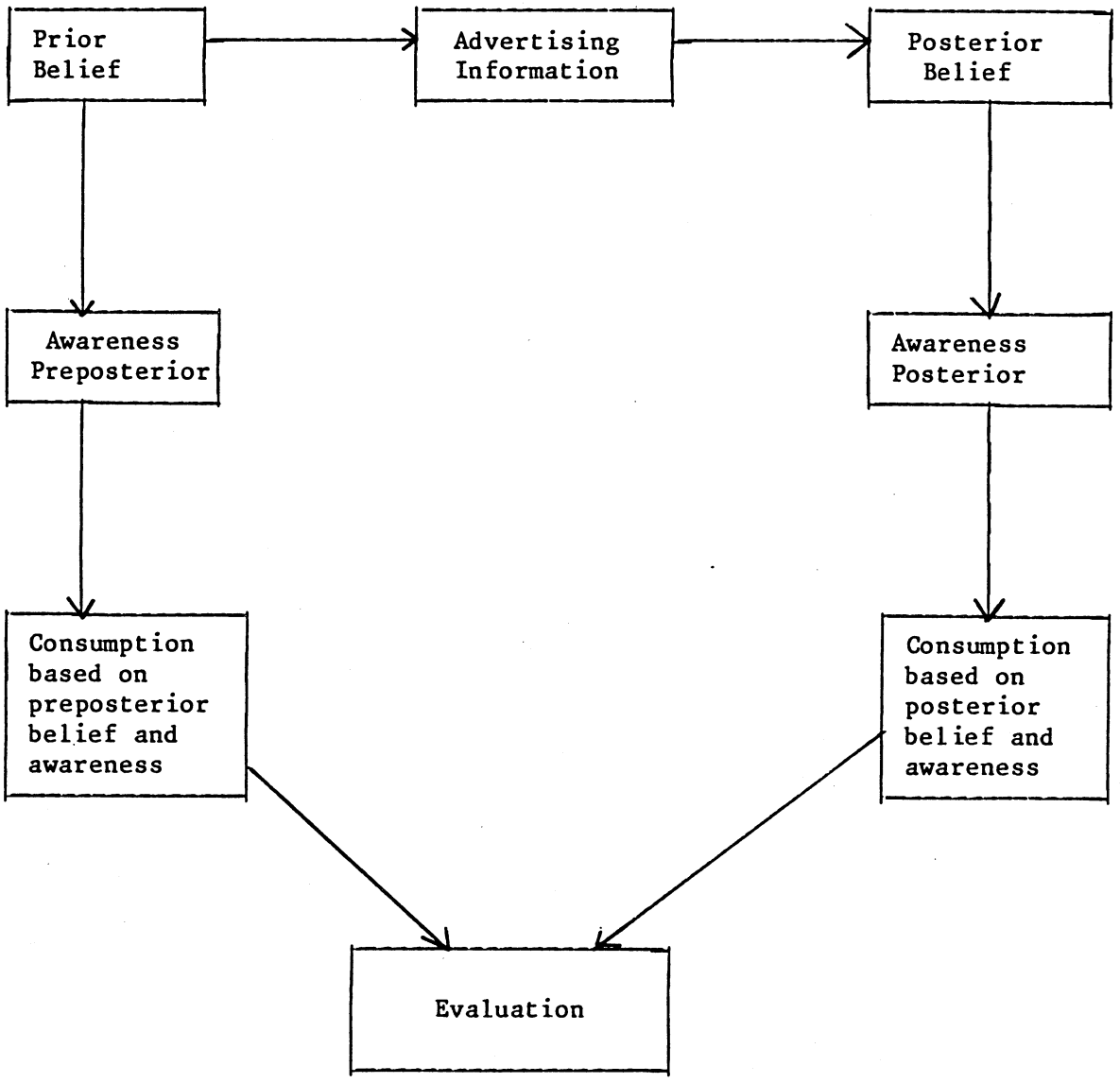

Figure 1. A decision theoretic framework for advertising information, awareness, and consumption.

Table 1. List of Variables with Mean and Standard Deviation

Variable	Mean	Standard Deviation
Proportion of High School Grad	0.81	7.33
Proportion of Not Married	0.44	0.29
Proportion of Blacks	0.09	0.11
Income (mid point)	26250	14024
Age (mid point)	29.83	7.38
Probability of Seeing/Hearing "Ad"	0.75	0.13
Probability of "Awareness"	0.23	0.19
Probability of Consumption of Dairy Products	0.43	0.07
Probability of Consumption of Milk	0.70	0.13
Probability of Consumption of Cheese	0.47	0.12

Source: Calcium Ad Tracking Survey, Market Facts, Inc.

Table 2. Minimum Chi-Squared Generalized Least Square Estimate of Advertising and Awareness

Variable	Probability of Seeing/ Hearing Ad	Probability of Awareness		
		Model A	Model B	Model C
Household Income (x 10^5)	0.26			0.15
	(0.77)			(0.26)
Age	-0.01*			-0.02*
	(-2.22)			(-2.04)
Proportion of Blacks	-0.92*			0.08
	(-2.22)			(0.11)
Proportion of High School Grad.	0.12			0.89
	(0.38)			(1.58)
Proportion of Not Married	-0.32			-0.03
	(1.42)			(-0.08)
Probability of "Ad"			1.39**	0.95
			(2.72)	(1.63)
Month 1 (November)	0.11	-0.007	-0.02	-0.11
	(0.66)	(-0.03)	(-0.07)	(-0.39)
Month 2 (December)	0.12	0.02	0.01	-0.04
	(0.76)	(0.07)	(0.03)	(-0.13)
Month 3 (January)	0.14	0.004	-0.06	-0.09
	(0.93)	(0.01)	(-0.23)	(-0.35)
Month 4 (February)	0.06	0.27	0.27	0.20
	(0.37)	(0.94)	(0.98)	(0.72)
Month 5 (March)	0.46**	-0.25	-0.41	-0.41
	(2.91)	(-0.85)	(-1.39)	(-1.37)
Month 6 (April)	0.07	-0.12	-0.12	-0.15
	(0.46)	(-0.45)	(-0.46)	(-0.56)
Month 7 (May)	0.51**	0.19	-0.01	0.03
	(3.09)	(0.66)	(-0.03)	(0.11)
Month 8 (June)	0.48**	-0.05	-0.22	-0.22
	(2.89)	(-0.19)	(-0.77)	(-0.78)
Month 9 (July)	0.46**	-0.01	-0.21	-0.21
	(2.78)	(-0.05)	(-0.76)	(-0.75)
Month 10 (August)	0.09	-0.12	-0.12	-0.16
	(0.59)	(-0.41)	(-0.63)	(-0.57)
Month 11 (September)	0.01	-0.84**	-0.85**	-0.87**
	(0.10)	(-3.60)	(-3.70)	(-3.82)
Intercept	0.94*	-0.70**	-1.68**	-1.43
	(2.21)	(-3.77)	(-4.16)	(-1.71)
Adjusted R^2	0.60	0.63	0.65	0.66
F Statistic	14.31**	23.38**	23.08**	17.15**
(df1, df2)	(16,127)	(11,132)	(12,131)	(17,126)

The figures in the parentheses indicate 't' statistics.
*Denotes significance at 10% level.
**Denotes significance at 5% level.

Table 3. Minimum Chi-Squared Generalized Least Square Estimates of Probability of Consumption of Dairy Products.

Variable	Basic Model IIA	Cognizant Model IIA	Cognizant Model IIB	Advertising Model IIIA	Advertising Model IIIB
Household Income (x 10^5)	-0.13 (-1.14)		-0.13 (-1.13)		-0.15 (-1.29)
Age	-0.01** (-4.52)		-0.01** (-4.40)		-0.01** (-4.26)
Proportion of Blacks	-0.12 (-0.85)		-0.12 (-0.84)		-0.07 (-0.45)
Proportion of High School Grad.	0.04 (0.33)		0.03 (0.30)		0.01 (0.13)
Proportion of Not Married	-0.17* (-2.17)		-0.17* (-2.16)		-0.16* (-2.00)
Probability of "Ad"				0.27** (2.45)	0.20 (1.68)
Probability of Awareness		0.76 (1.15)	0.01 (0.14)		
Month 1 (November)	0.04 (0.69)	0.06 (1.05)	0.04 (0.69)	0.05 (0.84)	0.04 (0.66)
Month 2 (December)	0.01 (0.23)	0.01 (0.11)	0.13 (0.22)	-0.003 (-0.05)	0.01 (0.10)
Month 3 (January)	-0.02 (-0.39)	-0.01 (-0.20)	-0.02 (-0.38)	-0.03 (-0.51)	-0.03 (-0.56)
Month 4 (February)	-0.11 (-1.92)	-0.10 (-1.64)	-0.11 (-1.91)	-0.10 (-1.68)	-0.11 (-1.93)
Month 5 (March)	-0.02 (-0.44)	-0.01 (-0.08)	-0.02 (-0.42)	-0.05 (-0.76)	-0.05 (-0.81)
Month 6 (April)	-0.01 (-0.26)	0.0001 (0.002)	-0.01 (-0.25)	-0.01 (-0.25)	-0.02 (-0.35)
Month 7 (May)	-0.07 (-1.29)	-0.07 (-1.12)	-0.07 (-1.29)	-0.11 (-1.76)	-0.10 (-1.76)
Month 8 (June)	-0.02 (-0.33)	0.006 (0.06)	-0.02 (-0.32)	-0.04 (-0.63)	-0.04 (-0.74)
Month 9 (July)	-0.06 (-1.06)	-0.04 (-0.65)	-0.06 (-1.04)	-0.08 (-1.42)	-0.86 (-1.50)
Month 10 (August)	0.03 (0.53)	0.04 (0.73)	0.03 (0.54)	-0.03 (0.49)	0.03 (0.47)
Month 11 (September)	-0.02 (-0.51)	0.01 (0.20)	-0.02 (-0.45)	-0.007 (-0.51)	-0.02 (-0.54)
Intercept	0.21 (1.37)	-0.20** (-4.84)	0.21 (1.34)	0.37 (-4.40)	0.64 (0.37)
Adjusted R^2	0.45	0.38	0.44	0.40	0.45
F Statistic (df1,df2)	8.21** (16,127)	8.22** (12,131)	7.67** (17,126)	8.90** (12,131)	8.00** (17,126)

The figures in the parenthese indicate 't' statistics.
*Denotes significance at 10% level.
**Denotes significance at 5% level.

Table 4. Minimum Chi-Squared Generalized Least Square Estimates for Probability of Consumption of Milk.

Variable	Basic Model IA	Cognizant Model IIA	Cognizant Model IIB	Advertising Model IIIA	Advertising Model IIIB
Household Income (x 10^5)	-0.38 (-1.20)		-0.38 (-1.20)		-0.41 (-1.29)
Age	-0.02** (-3.78)		-0.02** (-3.56)		-0.02** (-3.62)
Proportion of Blacks	-0.20 (-0.50)		-0.19 (-0.48)		-0.13 (-0.32)
Proportion of High School Grad.	-0.10 (-0.33)		-0.14 (-0.65)		-0.13 (-0.42)
Proportion of Not Married	-0.36 (-1.68)		-0.35 (-1.67)		-0.34 (-1.58)
Probability of "Ad"				0.28 (0.96)	0.27 (0.83)
Probability of Awareness		0.23 (1.33)	0.13 (0.77)		
Month 1 (November)	0.12 (0.77)	0.15 (0.91)	0.13 (0.82)	0.13 (0.80)	0.12 (0.75)
Month 2 (December)	-0.09 (-0.61)	-0.12 (-0.78)	-0.09 (-0.61)	-0.13 (-0.83)	-0.10 (-0.66)
Month 3 (January)	-0.02 (-0.13)	-0.02 (-0.11)	-0.01 (-0.08)	-0.04 (-0.25)	-0.03 (-0.20)
Month 4 (February)	-0.21 (-1.45)	-0.22 (-1.45)	-0.22 (-1.49)	-0.21 (-1.37)	-0.21 (-1.44)
Month 5 (March)	-0.11 (-0.78)	-0.07 (-0.48)	-0.10 (-0.67)	-0.13 (-0.84)	-0.15 (-0.96)
Month 6 (April)	-0.06 (-0.41)	-0.05 (-0.31)	-0.05 (-0.33)	-0.07 (-0.46)	-0.06 (-0.44)
Month 7 (May)	0.0002 (0.001)	0.004 (0.03)	-0.003 (-0.02)	-0.03 (-0.20)	-0.04 (-0.24)
Month 8 (June)	-0.007 (-0.05)	0.02 (0.13)	0.0002 (0.001)	-0.02 (-0.15)	-0.04 (-0.24)
Month 9 (July)	-0.12 (-0.80)	-0.10 (-0.68)	-0.11 (-0.76)	-0.15 (-0.97)	-0.15 (-1.00)
Month 10 (August)	0.001 (0.004)	0.02 (0.13)	0.01 (0.07)	-0.003 (-0.02)	-0.003 (-0.02)
Month 11 (September)	0.007 (0.06)	0.08 (0.65)	0.03 (0.27)	0.04 (0.31)	0.007 (0.06)
Intercept	1.54** (3.82)	0.46** (4.23)	1.51** (3.71)	0.33 (1.49)	1.35** (2.91)
Adjusted R^2	0.49	0.45	0.49	0.45	0.49
Statistics	9.52**	10.88**	8.97**	10.74**	8.98**
df1,df2)	(16,127)	(12,131)	(17,126)	(12,131)	(17,126)

The figures in the parentheses indicate 't' statistics.
*Denotes significance at 10% level.
**Denotes significance at 5% level.

Table 5. Minimum Chi-Squared Generalized Least Square Estimates of Probability of Consumption of Cheese.

Variable	Basic Model IA	Cognizant Model IIA	Cognizant Model IIB	Advertising Model IIIA	Advertising Model IIIB
Household Income (x 10^5)	-0.56**		-0.56**		-0.57**
	(-2.69)		(-2.70)		(-2.71)
Age	-0.01**		-0.01**		-0.01**
	(-3.37)		(-3.55)		(-3.25)
Proportion of Blacks	-0.22		-0.23		-0.19
	(-0.85)		(-0.89)		(-0.72)
Proportion of High School Grad.	-0.21		0.02		-0.03
	(-0.11)		(0.10)		(-0.16)
Proportion of Not Married	-0.42**		-0.42**		-0.41**
	(-3.01)		(-3.04)		(-2.93)
Probability of "Ad"				0.19	0.10
				(0.97)	(0.47)
Probability of Awareness		-0.07	-0.14		
		(-0.60)	(-1.25)		
Month 1 (November)	0.03	0.06	0.02	0.06	0.03
	(0.28)	(0.63)	(0.19)	(0.54)	(0.27)
Month 2 (December)	0.04	0.02	0.04	0.01	0.03
	(0.38)	(0.22)	(0.39)	(0.13)	(0.34)
Month 3 (January)	-0.08	-0.08	-0.09	-0.09	-0.08
	(-0.84)	(-0.78)	(-0.91)	(-0.86)	(-0.88)
Month 4 (February)	-0.07	-0.04	-0.07	-0.05	-0.07
	(-0.73)	(-0.35)	(-0.65)	(-0.46)	(-0.73)
Month 5 (March)	0.003	0.03	-0.01	0.009	-0.009
	(0.04)	(0.25)	(-0.12)	(0.09)	(-0.009)
Month 6 (April)	-0.01	0.004	-0.02	0.002	-0.01
	(-0.12)	(0.04)	(-0.23)	(0.02)	(-0.14)
Month 7 (May)	-0.21*	-0.19	-0.20*	-0.22*	-0.22*
	(-2.10)	(-1.82)	(-2.06)	(-2.05)	(-2.14)
Month 8 (June)	-0.05	-0.01	-0.06	-0.04	-0.06
	(-0.48)	(-0.11)	(-0.55)	(-0.35)	(-0.57)
Month 9 (July)	-0.08	-0.05	-0.09	-0.08	-0.09
	(-0.82)	(-0.49)	(-0.41)	(-0.74)	(-0.91)
Month 10 (August)	0.06	0.07	0.05	0.07	0.06
	(0.63)	(0.66)	(0.51)	(0.63)	(0.61)
Month 11 (September)	-0.10	-0.07	-0.13	-0.06	-0.10
	(-1.31)	(-0.79)	(-1.60)	(-0.69)	(-1.31)
Intercept	0.68**	-0.06	0.71**	-0.21	0.61*
	(2.55)	(-0.86)	(2.67)	(-1.41)	(1.98)
Adjusted R^2	0.45	0.41	0.46	0.41	0.45
F Statistic	8.43**	9.11**	8.06**	9.21**	7.90**
(df1,df2)	(16,127)	(12,131)	(17,126)	(12,131)	(17,126)

The figures in the parentheses indicate 't' statistics.
*Denotes significance at 10% level.
**Denotes significance at 5% level.

Table 6. Results of Likelihood Ratio Tests for Comparisons of Selected Models

Models	Number of Restrictions	Chi-Squared Test Statistic	Conclusion
Consumption of Dairy Products			
Model IIA vs IIB	5	20.86*	Accept Model IIB
Model I vs IIB	1	0.12	Failed to reject Model I
Model IIIA vs IIIB	5	19.00**	Accept Model IIIB
Model I vs IIIB	1	3.04*	Accept Model IIIB
Consumption of Milk			
Model IIA vs IIB	5	14.04**	Accept Model IIB
Model I vs IIB	1	0.54	Failed to reject Model I
Model IIIA vs IIIB	5	15.1**	Accept Model IIIB
Model I vs IIIB	1	0.66	Failed to reject Model I
Consumption of Cheese			
Model IIA vs IIB	5	17.96**	Accept Model IIB
Model I vs IIB	1	1.64	Failed to reject Model I
Model IIIA vs IIIB	5	15.82**	Accept Model IIIB
Model I vs IIIB	1	0.12	Failed to reject Model I

**Denotes significance at 5% level.
*Denotes significance at 10% level.